COMMONWEALTH OF PUERTO RICO
PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU

IN RE: WIND DEVELOPMENT STUDY	**CASE NO.:** NEPR-MI-2021-0015 SUBJECT: Submission of Gantt Chart and Presentation for Technical Conference to be Held on October 1, 2021

MOTION SUBMITTING GANTT CHART AND PRESENTATION FOR TECHNICAL CONFERENCE TO BE HELD ON OCTOBER 1, 2021

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW LUMA Energy ServCo, LLC ("ServCo" or "LUMA"), and, through the undersigned legal counsel, respectfully submits the following:

1. On August 24, 2020, this Honorable Energy Bureau ("Energy Bureau") issued a Final Resolution and Order approving an Integrated Resources Plan and Modified Action Plan ("August 24th Order") in Case No. CEPR-AP-2018-0001. As part of the August 24th Order, the Energy Bureau ordered the Puerto Rico Electric Power Authority ("PREPA") to (i) conduct an offshore wind study tailored to Puerto Rico's wind resource and the electric grid that evaluates the cost, generation profile, and other characteristics of anchored and floating wind turbine options; (ii) properly and fully account for market-based costs and evening peak performance of onshore wind resources, and especially considering the performance of onshore wind resources designed for "low wind" regimes, using the most up-to-date information available; and (iii) properly and fully account for market-based costs and evening peak performance of offshore wind resources, using the most up-to-date information available, (hereinafter, the "Wind Study").

2. On October 6, 2020, this Energy Bureau issued a Resolution and Order in Case No. CEPR-AP-2018-0001, opening Case No. NEPR-MI-2020-0012 to manage the implementation

phase of the approved Integrated Resources Plan and the Modified Action Plan, including the Wind Study.

3. On July 23, 2021, this Energy Bureau issued a Resolution and Order setting forth a procedural calendar to complete various action items in Case No. NEPR-MI-2020-0012 ("July 23rd Order"). Among other things, this Energy Bureau ordered PREPA and LUMA to submit a Gantt Chart showing the timeline for the completion of the Wind Study and gathering of information necessary to comply with the August 24th Order. Further, it instructed that the Gantt Chart detail the required events, phases, or tasks needed to comply with the August 24th Order. The Energy Bureau set September 15, 2021, as the deadline to submit the Gantt Chart.

4. Moreover, in the July 23rd Order, the Energy Bureau directed LUMA to file a copy of the presentation to be made during the Virtual Technical Conference initially scheduled for September 21, 2021, on or before September 17, 2021.

5. On September 10, 2021, LUMA and PREPA filed a *Joint Motion Requesting Clarification of a Portion of the Energy Bureau's Resolution and Order of July 23, 2021*, in Case No. NEPR-MI-2020-0012. LUMA requested the Energy Bureau to clarify that it was the entity responsible for implementing the required activities related to the Wind Study.

6. On September 15, 2021, the Energy Bureau issued a Resolution and Order in Case No. NEPR-MI-2020-0012 ("September 15th Order"), clarifying that LUMA is responsible for complying with implementing all required activities related to the Wind Study. Further, this Energy Bureau rescheduled the procedural calendar established in the July 23rd Order and instructed LUMA to submit the Gantt Chart showing the timeline for completing the study on or before noon on Friday, September 24, 2021. It also ordered LUMA to file on or before noon

September 28, 2021, the presentation it intends to use during the Virtual Technical Conference, to be held on October 1, 2021.

7. On September 17, 2021, this Energy Bureau issued a Resolution and Order in Case No. NEPR-MI-2020-0012, determining that it was beneficial and appropriate to evaluate the development of the Wind Study under a separate docket, thus initiating the instant proceeding.

8. In compliance with the above-mentioned orders, LUMA is submitting the Gantt Chart as Exhibit 1 of this Motion today. The Gantt Chart presented herein details the timeline to comply with the August 24th Order, including the relevant tasks and phases. Additionally, LUMA is submitting a copy of the presentation for the upcoming Virtual Technical Conference in PDF format, as Exhibit 2 to this Motion.

WHEREFORE, LUMA respectfully requests that the Energy Bureau **take notice** of the aforementioned, **accept** the Gantt Chart and the presentation for the Virtual Technical Conference submitted today, respectively as Exhibits 1 and 2 to this Motion, and **deem** that LUMA complied with the relevant parts of the July 23rd and September 15th Orders.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 24th day of September 2021.

We hereby certify that we filed this Motion using the electronic filing system of this Energy Bureau and that we will send an electronic copy of this **Motion to the attorneys for PREPA**, Joannely Marrero-Cruz, jmarrero@diazvaz.law; and Katiuska Bolaños-Lugo, kbolanos@diazvaz.law.

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EXHIBIT 1

(to be submitted via e-mail)

EXHIBIT 2

Wind Study Technical Conference

October 1, 2021

NEPR-MI-2021-0015

Agenda

- Project Overview
- Prior Wind Study Experience
- Task 1: Wind Resource Data Creation
- Task 2: Wind Cost and Performance Analysis
- Deliverables
- Timeline / Gantt Chart

Project Overview

Scope of the Energy Bureau's Requested Wind Study

- On August 24, 2020, the Energy Bureau issued a Final Resolution and Order approving an Integrated Resource Plan and Modified Action Plan in Case No. CEPR-AP-2018-0001. On September 17, 2021, the Energy Bureau issued a Resolution and Order creating a new proceeding under Case No. NEPR-MI-2021-0015.
- In the August 24 order, the Energy Bureau requested the following:
  - Conduct an offshore wind study tailored to Puerto Rico's wind resource and electric grid that evaluates the cost, generation profile, and other characteristics of anchored and floating wind turbine options.
  - Properly and fully account for market-based costs and evening peak performance of onshore wind resources, and especially considering the performance of onshore wind resources designed for "low wind" regime and using the most up-to-date information available; and
  - Properly and fully account for market-based costs and evening peak performance of offshore wind resources, using the most up-to-date information available.

Role of LUMA in preparation of the Wind Study

- Under the Transmission and Distribution Operating and Maintenance Agreement (T&D OMA), LUMA was contracted to provide management, operation, maintenance, repair, restoration and replacement and other related services for the T&D System.

- The T&D OMA further provides that LUMA "shall (A) be entitled to exercise all of the rights and perform the responsibilities of [PREPA] in providing the O&M Services, and (B) have the autonomy and responsibility to operate and maintain the T&D System and **establish the related plans,** policies, procedures and programs with respect thereto as provided in [the OMA]." *OMA, Section 5.1.*

- The T&D OMA provides that LUMA shall function as agent of PREPA and PREPA "irrevocably authorizes [LUMA] to (i) represent [PREPA] before [the Energy Bureau] with respect to any matter related to the performance of any O&M Services provided by [LUMA] under [the OMA]" and "(ii) prepare all related filings and other submissions before [the Energy Bureau]" among other functions. *OMA, Section 5.6 (a).*

- As a result of these provisions within the T&D OMA, preparation of the Wind Study is the responsibility of LUMA as part of the O&M Services.

NREL Partnership

- Provide 15 years of hourly and 5 years of 5-minute wind data for an area that encompasses Puerto Rico and surrounding waters. This data will include extreme weather events as well as then typical wind speeds, profiles as needed for this analysis as well as PR 100.

- Provide gridded data for the cost [Levelized Cost of Energy ("LCOE"), capital, etc.] for onshore and offshore wind for low-wind speed and "typhoon-rated" wind turbines. This is the cost information that the Energy Bureau has requested.

- NREL will connect with LUMA, the Energy Bureau and other stakeholders as needed to determine these costs in conjunction with advanced modeling capabilities.

Prior Wind Study Efforts

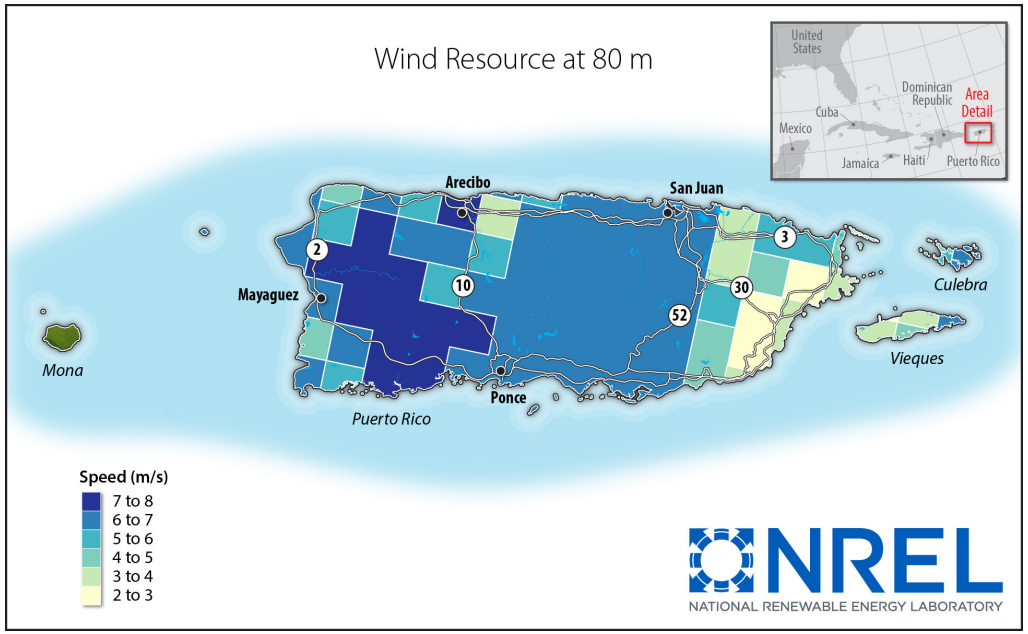
NREL Experience: Onshore Wind Resource Evaluation

Data Source	Spatial Resolution	Temporal Resolution
MERRA-2	~50km^2	Hourly
NAM	~12km^2	6-Hourly

Require spatial resolution of NAM and the temporal resolution of MERRA-2

Issues:

1. Large Grid Cells
2. Data not as robust as other NREL wind data
3. No sub-hourly data available
4. Not consistent with NREL Wind Toolkit (like CONUS)
5. Some prior offshore wind taken from other sources but only 1 year available



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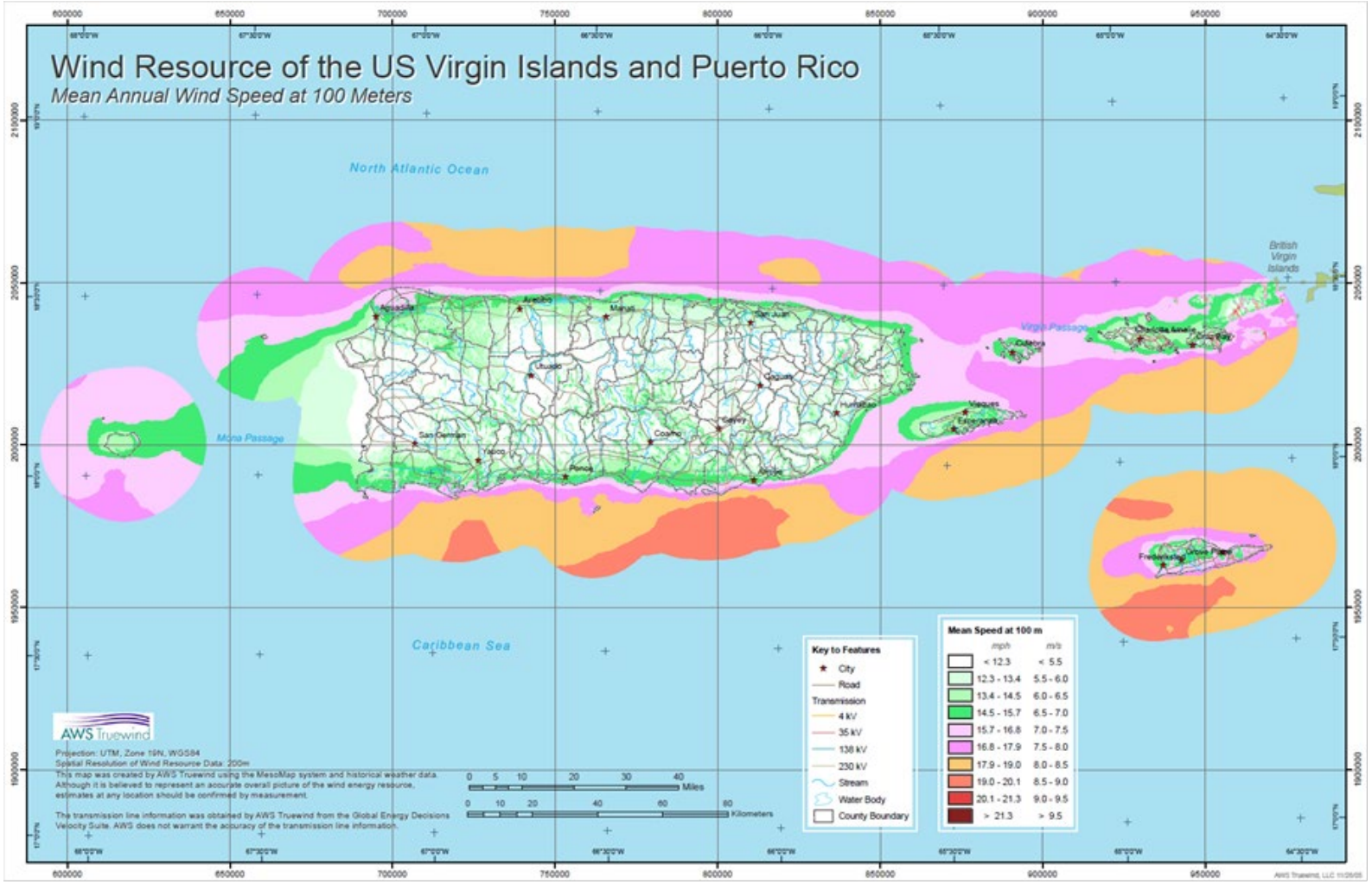
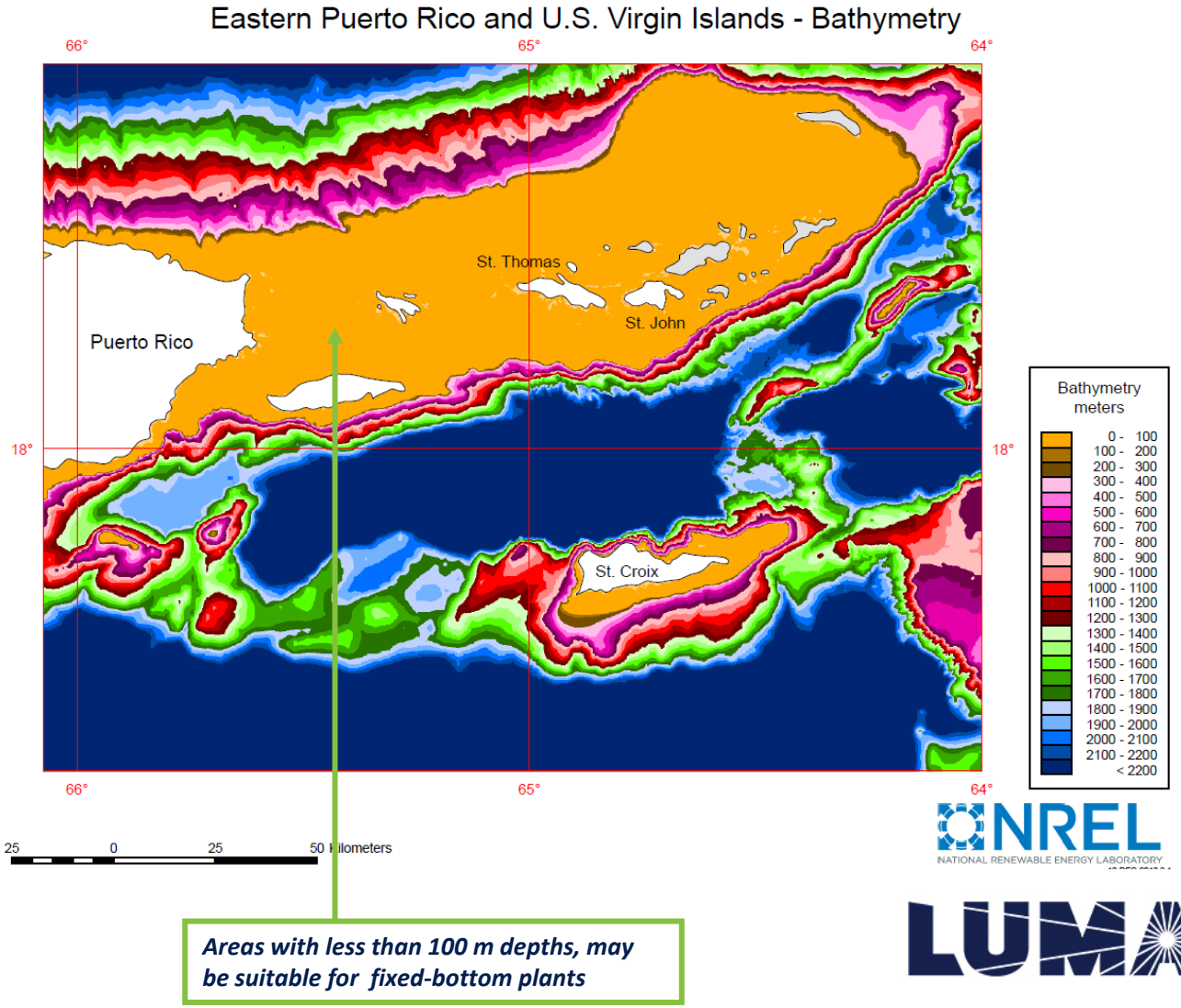
NREL Experience: Offshore Wind Resource Evaluation

- This effort was valuable as it shows key potential offshore wind areas.
- However, this effort provided the mean annual average and not hourly or sub-hourly for 15 years.



NREL Experience: Bathymetry

- Bathymetry is the study of underwater depth of ocean floors or lake floors.
- Bathymetry maps were developed by NREL for inter-island transmission studies, not OSW intergradation
- Higher resolution bathymetry maps are needed for offshore wind power plant siting analysis
- Plant locations, distances from shore and plant capacities will have impacts on integration costs and system reliability



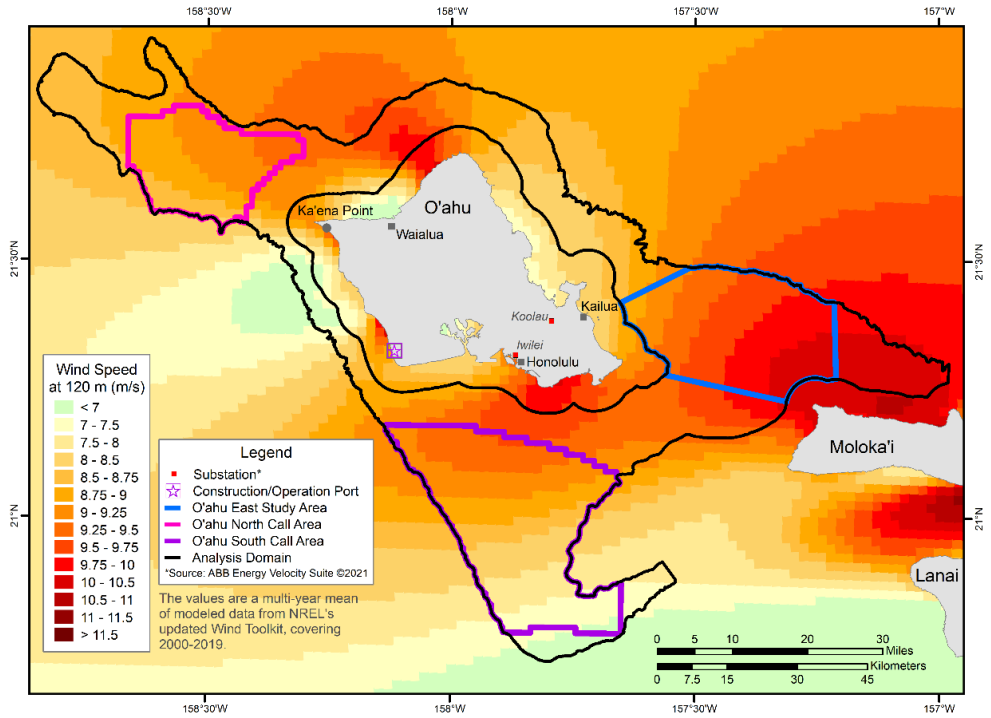
LUMA

Task 1: Wind Resource Data Creation

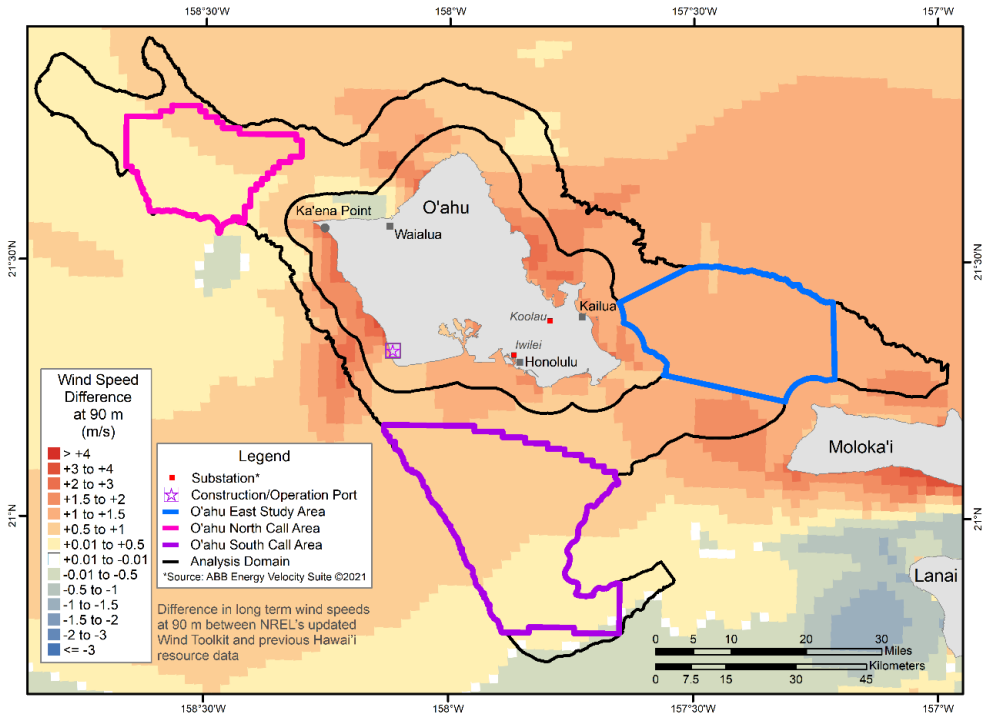
Hawaii Example: Wind Study Accuracy

High resolution will improve wind study accuracy and find areas with the largest capacity over time

New Wind Resource Data



AWS / Vaisala Data Set

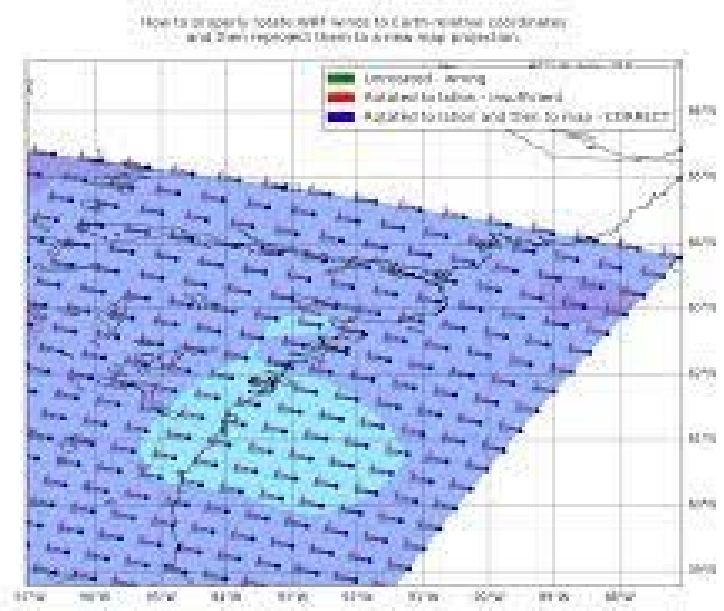


***Note**: Significant changes were observed when a similar process was performed in Hawaii*

Task 1: Generation of Gridded Wind data for the Region

- **High-Level**: Run the Weather Resource and Forecasting (WRF) model for the Puerto Rico region for 15 years.
- During Task 1, NREL will produce data sets which will be available for additional analysis in Task 2.

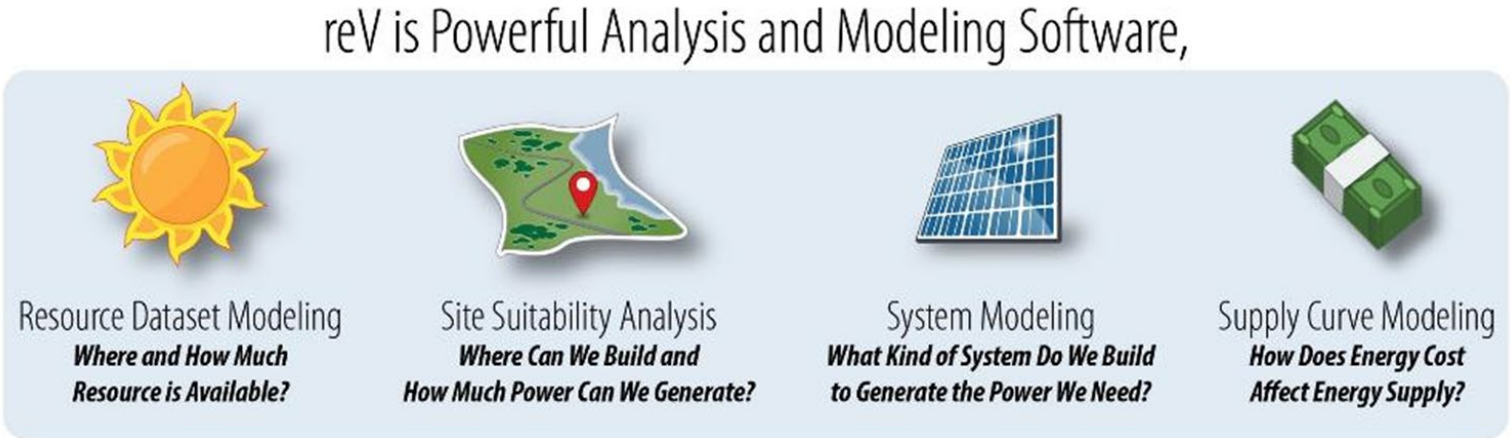
- **Specific Subtasks**:
  - **Subtask 1.1**: Development of WRF grid and settings determination of output for Puerto Rico
  - **Subtask 1.2**: Development of initial and boundary conditions for Puerto Rico
  - **Subtask 1.3**: Development of wind data from WRF runs
  - **Subtask 1.4**: Quality control of data
  - **Subtask 1.5**: Data conversion and delivery
  - **Subtask 1.6**: Reporting and support for users



Task 2: Wind Cost and Performance Analysis

Task 2: Techno-economic analysis of possible wind deployment

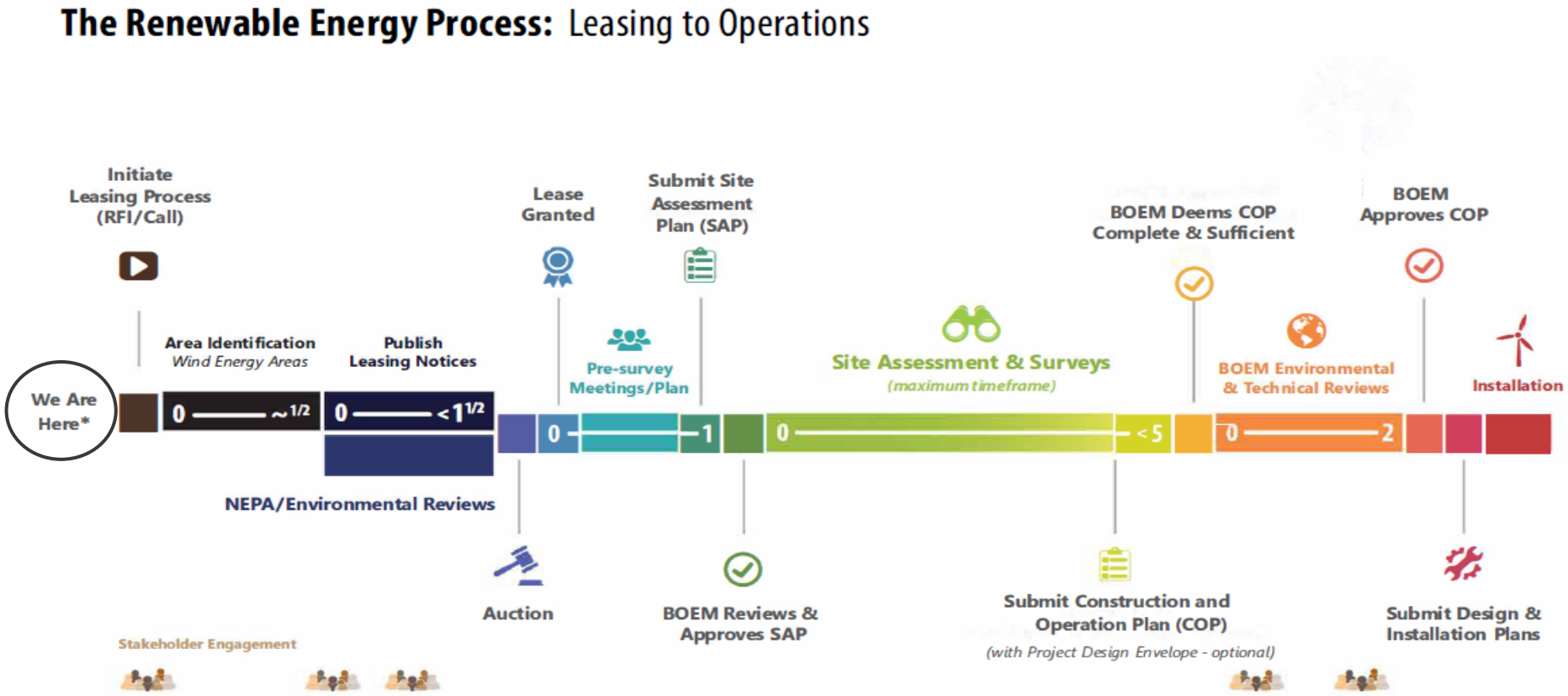
- **High-Level**: Evaluate the cost and feasibility of deploying land-based and offshore wind in Puerto Rico for current conditions and into the future.
- The modeling efforts will rely on NREL's Renewable Energy Potential Model (reV) and NREL's bottom-up land-based and offshore wind balance-of-system models (**LandBOSSE** and **ORBIT**, respectively).
  - **reV** is a spatial-temporal modeling assessment tool that calculates renewable energy capacity, generation and costs based on geospatial intersection with grid infrastructure and land-use characteristics.
  - **LandBOSSE** and **ORBIT** evaluate the effects of plant-level technology choices (e.g., turbine rating, hub height, offshore foundation type) and available infrastructure (e.g., crane availability, port infrastructure) on project cost and logistics.



Source: NREL

Resources Development Timeline

- The typical timeline from area identification to installation ranges from 10-15 years.

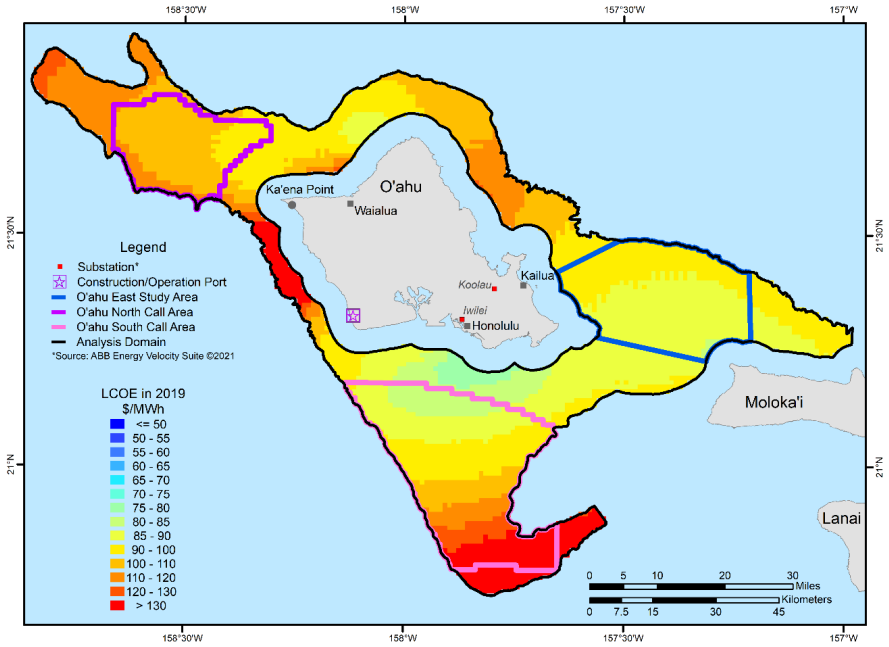


Source: Bureau of Ocean Energy Management, Renewable Energy Process, June 12, 2020

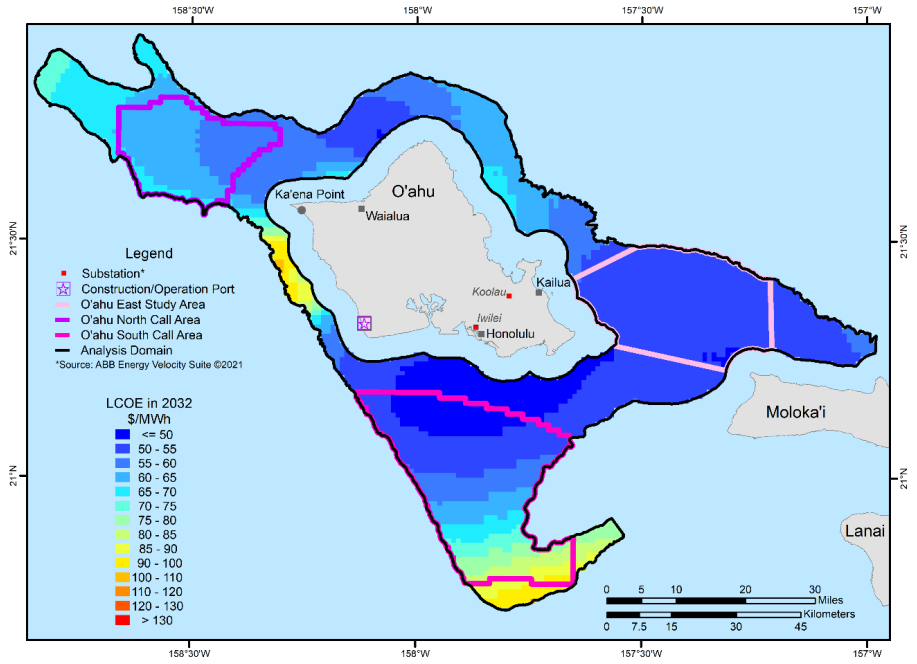
Hawaii Example 1: Changes in LCOE over time

Levelized Cost of Energy (LCOE) will evolve over time as the grid and its utilization changes from the current state.

Regional LCOE in 2019

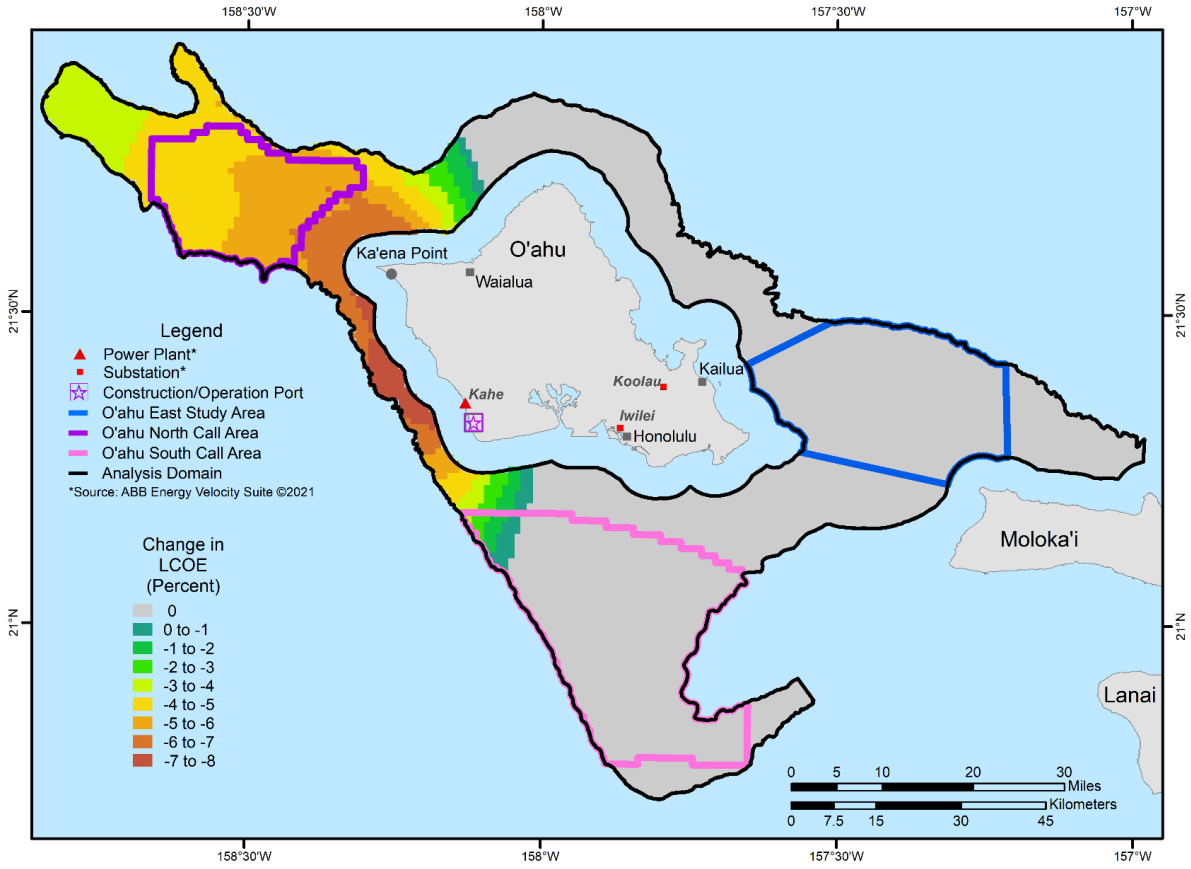


Regional LCOE 2032



Hawaii Example 2: Impact of Interconnection

Levelized Cost Of Energy sensitivity to additional interconnection point on west side of O'ahu.



Task 2 Subtasks

Subtask 2.1: Solicitation of stakeholder input on wind deployment regions

- This subtask engages LUMA/PREPA and others that have relevant data

Subtask 2.2: Data gathering and model customization

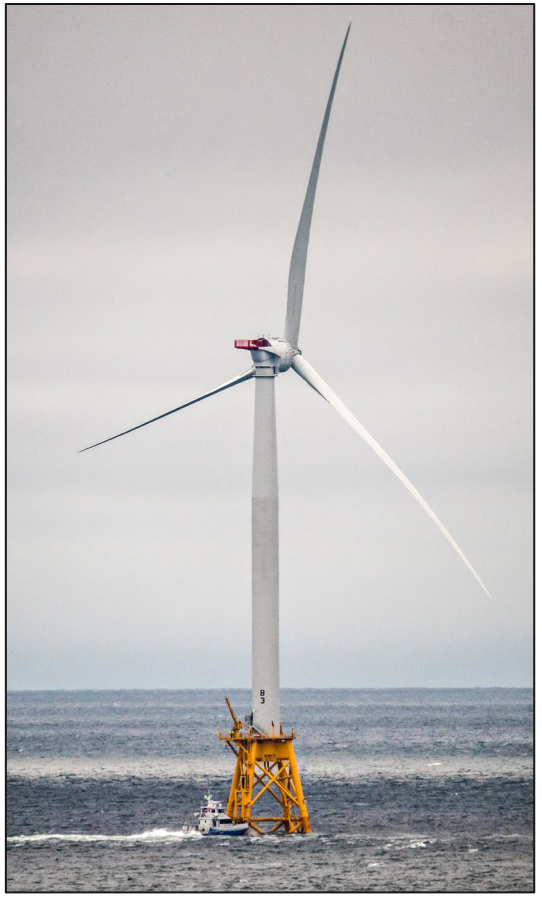
- This subtask actually tunes and preps all the models for analysis with Puerto Rico appropriate inputs

Subtask 2.3: Model runs

- Running the model, look for errors, evaluating results
- Results for LUMA available at this point

Subtask 2.4: Reporting

- The team will complete written report



Deliverables

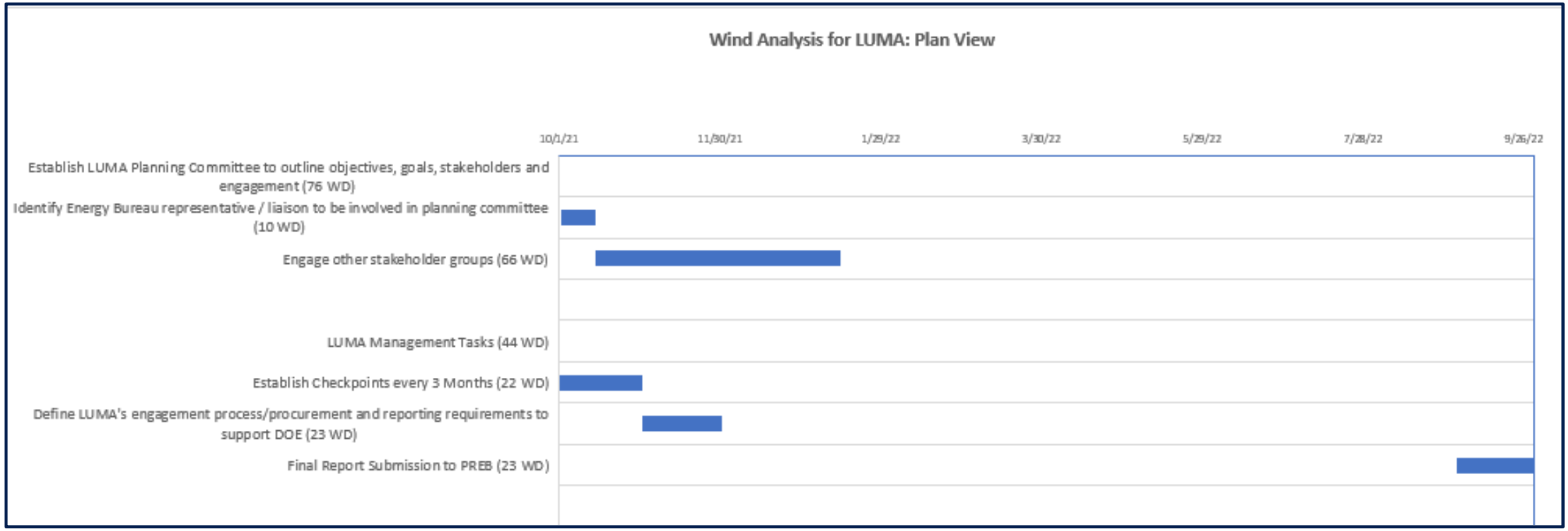
Deliverables

A variety of reports, presentations and long-term record of effort will be provided but the key deliverables for LUMA are:

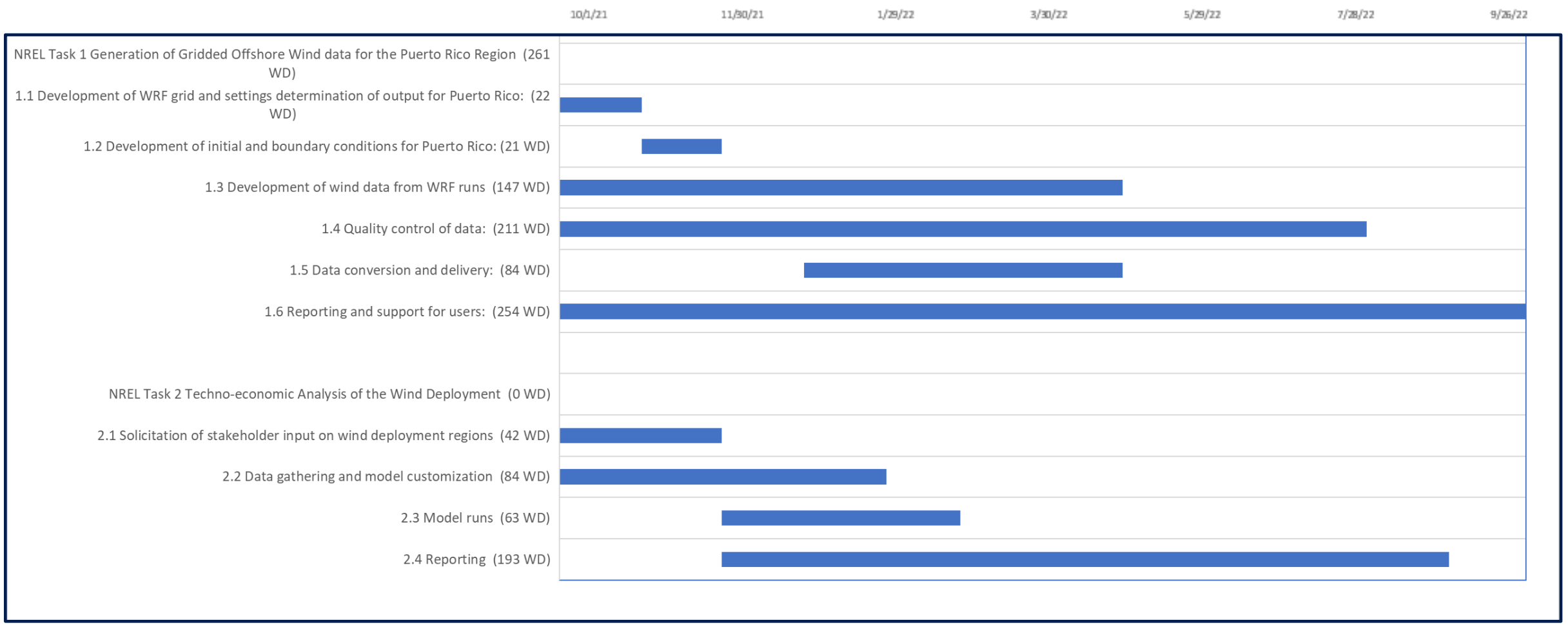
- **Month 4**: 1 year of data useful for LUMA and Task 2
- **Month 6**: Delivery of cost results for both onshore and offshore current and future costs
- **Month 8**: All 15 years of data (with years provided as available)
- A final written report and presentation will be prepared

Timeline

Gantt Chart: LUMA Activities



Gantt Chart: NREL Activities



LUMA

NREL
Transforming ENERGY

Thank you